Clearcoat material and its use to produce clearcoats and multicoat color and/or effect coating systems

What is claimed is:

1. The use of a copolymer (A) preparable by free-radical polymerization of

a) at least one olefinically unsaturated monomer and

b) at least one olefinically unsaturated monomer different than the olefinically unsaturated monomer (a) and of the general formula I

$$R^1R^2C=CR^3R^4 \qquad (I),$$

in which the radicals R^1, R^2, R^3 and R^4 each independently of one another are hydrogen atoms or substituted or unsubstituted alkyl, cycloalkyl, alkylcycloalkyl, cycloalkylalkyl, aryl, alkylaryl, cycloalkylaryl, arylalkyl or arylcycloalkyl radicals, with the proviso that at least two of the variables R^1, R^2, R^3 and R^4 are substituted or unsubstituted aryl, arylalkyl or arylcycloalkyl radicals,

especially substituted or unsubstituted aryl radicals;

in an aqueous medium, in a clearcoat material used to produce clearcoats KL and multicoat color and/or effect coating systems ML.

2. A clearcoat material comprising

(A) as binder, or one of the binders, at least one copolymer preparable by free-radical polymerization of

a) at least one olefinically unsaturated monomer and

b) at least one olefinically unsaturated monomer different than the olefinically unsaturated monomer (a) and of the general formula I

$$R^1R^2C=CR^3R^4 \qquad (I),$$

in which the radicals R^1, R^2, R^3 and R^4 each independently of one another are hydrogen atoms or substituted or unsubstituted alkyl, cycloalkyl,

alkylcycloalkyl, cycloalkylalkyl, aryl, alkylaryl, cycloalkylaryl, arylalkyl or arylcycloalkyl radicals, with the proviso that at least two of the variables R^1, R^2, R^3 and R^4 are substituted or unsubstituted aryl, arylalkyl or arylcycloalkyl radicals, especially substituted or unsubstituted aryl radicals,

in an aqueous medium;

and

(B) at least one crosslinking agent containing at least two functional groups (bfg) which are able to undergo thermal crosslinking reactions with complementary functional groups (afg) in the constituent (A).

3. The use as claimed in claim 1 or clearcoat material as claimed in claim 2, wherein the copolymer (A) is obtainable by

(i) subjecting at least one monomer (a) and at least one monomer (b) to free-radical polymerization in an aqueous medium, and then

(ii) reacting the resultant reaction product with at least one further monomer (a) under free-radical conditions.

4. The use as claimed in claim 1 or 3 or clearcoat material as claimed in claim 2 or 3, wherein the aryl radicals R^1, R^2, R^3 and/or R^4 of the compound (b) comprise phenyl or naphthyl radicals, especially phenyl radicals.

5. The use as claimed in any of claims 1, 3 and 4 or clearcoat as claimed in any of claims 2 to 4, wherein the substituents in radicals R^1, R^2, R^3 and/or R^4 of the compound (b) are electron-donating or electron-withdrawing atoms or organic radicals, especially halogen atoms, nitrile, nitro, partially or fully halogenated alkyl, cycloalkyl, alkylcycloalkyl, cycloalkylalkyl, aryl, alkylaryl, cycloalkylaryl, arylalkyl and arylcycloalkyl radicals; aryloxy, alkyloxy and cycloalkyloxy radicals; arylthio, alkylthio and cycloalkylthio radicals; hydroxyl groups and/or primary, secondary and/or tertiary amino groups.

6. The use as claimed in any of claims 1 and 3 to 5 or clearcoat material as claimed in any of claims 2 to 5, wherein monomers (a) comprise

a1) (meth)acrylic esters which are essentially free from acid groups;

a2) monomers which carry per molecule at least one hydroxyl group, amino group, alkoxymethylamino group or imino group and are essentially free from acid groups;

a3) monomers which carry per molecule at least one acid group which can be converted to the corresponding acid anion group;

a4) vinyl esters of alpha-branched monocarboxylic acids having 5 to 18 carbon atoms in the molecule;

a5) reaction products of acrylic acid and/or methacrylic acid with the glycidyl ester of an alpha-branched monocarboxylic acid having 5 to 18 carbon atoms per molecule;

a6) cyclic and/or acyclic olefins;

a7) (meth)acrylamides;

a8) monomers containing epoxide groups;

a9) vinylaromatic hydrocarbons;

a10) nitriles;

a11) vinyl compounds, especially vinyl halides and/or vinylidene dihalides, N-vinylpyrrolidone, vinyl ethers and/or vinyl esters;

a12) allyl compounds, especially allyl ethers and allyl esters;

a13) polysiloxane macromonomers having a number-average molecular weight Mn of from 1000 to 40,000 and having on average from 0.5 to 2.5 ethylenically unsaturated double bonds per molecule; and/or

a14) acryloxysilane-containing vinyl monomers, preparable by reacting hydroxyl-functional silanes with epichlorohydrin and then reacting the reaction product with (meth)acrylic acid and/or hydroxyalkyl and/or hydroxycycloalkyl esters of (meth)acrylic acid (monomers a2).

7. The use as claimed in any of claims 1 and 3 to 6 or clearcoat material as claimed in any of claims 2 to 6, wherein the clearcoat material further comprises at least one of the following constituents:

A) at least one binder different than the copolymer (A) and containing at least one functional group (afg) which is able to undergo thermal crosslinking reactions with complementary functional groups (bfg) in the crosslinking agent (B);

C) at least one constituent which is crosslinkable with actinic radiation,

D) at least one photoinitiator,

E) at least one thermal crosslinking initiator,

F) at least one reactive diluent curable thermally and/or with actinic radiation,

G) at least one coatings additive, and/or

H) at least one organic solvent.

8. A clearcoat KL on a primed or unprimed substrate, producible from a clearcoat material as claimed in any of claims 2 to 7.

9. A process for producing a multicoat color and/or effect coating system ML on a primed or unprimed substrate by

(I) preparing a basecoat film by applying a basecoat material to the substrate,

(II) drying the basecoat film,

(III) preparing a clearcoat film by applying a clearcoat material to the basecoat film, and

(IV) jointly curing the basecoat film and the clearcoat film to give the basecoat BL and the clearcoat KL,

or

(I) preparing a surfacer film by applying a surfacer to the substrate,

(II) curing the surfacer film to give the surfacer coat FL,

(III) preparing a basecoat film by applying a basecoat material to the surfacer coat FL,

(IV) drying the basecoat film,

(V) preparing a clearcoat film by applying a clearcoat material to the basecoat film, and

(VI) jointly curing the basecoat film and the clearcoat film to give the basecoat BL and the clearcoat KL,

in which the clearcoat material as claimed in any of claims 2 to 7 is used as clearcoat material.

10. A multicoat color and/or effect coating system ML for a primed or unprimed substrate, comprising - situated above one another in the stated sequence -

(1) a color and/or effect basecoat BL, and

(2) a clearcoat KL

or

(1) a surfacer coat FL which absorbs mechanical energy,

(2) a color and/or effect basecoat BL, and

(3) a clearcoat KL,

wherein the clearcoat KL is produced with the clearcoat material as claimed in any of claims 2 to 7.

11. The use of the clearcoat KL as claimed in claim 8, of the multicoat system ML as claimed in claim 10, or of the process as claimed in claim 9 for automotive OEM finishing and refinishing, industrial coating, including coil coating and container coating, the coating of plastics, and furniture coating.

12. A primed or unprimed substrate comprising at least one multicoat system ML as claimed in claim 10, at least one multicoat system ML produced by the process as claimed in claim 9, and/or at least one clearcoat KL as claimed in claim 8.

BASF Coatings AG
PAT 99 170 DE

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Abstract

The use of a copolymer (A) preparable by free-radical polymerization of

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in an aqueous medium, in a clearcoat material used to produce clearcoats KL and multicoat color and/or effect coating systems ML.